

## CLAIMS

What is claimed is:

1. A code division multiple access user equipment for use in receiving a plurality of data signals received over a shared spectrum, each received data signal experiencing a similar channel response, the user equipment comprising:

means for receiving a combined signal of the received data signals over the shared spectrum;

means for sampling the combined signal at a multiple of a chip rate of the combined signal;

means for estimating a channel response for the combined signal at the multiple of the chip rate;

means for determining a cross correlation matrix using the estimated channel response;

means for determining the spread data vector using order recursions by determining a first spread data estimate using an element from the cross correlation matrix and recursively determining further estimates using additional elements of the cross correlation matrix; and

means for estimating data of the data signals using the spread data vector.

2. The user equipment of claim 1 wherein the spread data estimates are determined by combining a scalar and a vector portions of the spread data estimates.

3. The user equipment of claim 1 wherein the spread data vector determining is performed using Yule-Walker equations.

4. The user equipment of claim 1 wherein the first spread data estimate is determined using an element of an upper left corner of the cross correlation matrix.

5. A code division multiple access user equipment for use in receiving a plurality of data signals received over a shared spectrum, each received data signal experiencing a similar channel response, the user equipment comprising:

an antenna for receiving a combined signal of the received data signals over the shared spectrum;

a sampling device for sampling the combined signal at a multiple of a chip rate of the transmitted data signals;

a channel estimation device for estimating a channel response for the combined signal at the multiple of the chip rate; and

a single user detection device for determining a cross correlation matrix using the estimated channel responses, for determining the spread data vector using order recursions by determining a first spread data estimate using an element from the cross correlation matrix and recursively determining further estimates using additional elements of the cross correlation matrix; and

wherein data of the data signals is estimated from the spread data vector.

6. The user equipment of claim 5 wherein the spread data estimates are determined by combining a scalar and a vector portions of the spread data estimates.

7. The user equipment of claim 5 wherein the spread data vector determining is performed using Yule-Walker equations.

8. The user equipment of claim 5 wherein the first spread data estimate is determined using an element of an upper left corner of the cross correlation matrix.